



*Assessing and reducing the risk of ground-water contamination from*

# **Lawn and Garden Management**

**Fact/Worksheet 11**

## **Keeping Idaho's Water Clean**

### ***Why should I be concerned?***

Pesticides, fertilizers, and water play an important role in maintaining a successful lawn and garden. Pesticides control undesirable weeds, insects, diseases, and rodents; fertilizers increase the fertility of the soil to enhance the growth of plants; and of course water, is essential for the very life of the plants a homeowner is growing. However, if pesticides, fertilizers, and water are not used properly, there is potential that ground water and thus drinking water will be contaminated. Surface water can also be impacted if the chemicals are carried in runoff.

When pesticides are found in water supplies, they are rarely in high enough concentrations to cause immediate health effects. Rather, the concern is through their potential to cause problems from prolonged exposure.

Nitrate in ground water can be a result of fertilizer application. Infants younger than six months are believed to be susceptible to nitrate poisoning as their digestive system is not developed to kill the bacteria that converts nitrate into toxic nitrate. Nitrate interferes with the ability of blood to carry oxygen, so the baby may show signs of suffocation. The drinking water standard is 10 ppm ( $\text{NO}_3\text{-N}$ ). Nitrate poisoning may also occur in ruminant animals such as cattle and sheep.

**The goal of Home\*A\*Syst is to help you protect the environment and your drinking water.**

### ***How will these materials help me to protect my drinking water?***

This worksheet will help you protect your drinking water by:

- Helping you determine which of your lawn and garden practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

### ***How do I complete the worksheet?***

After reviewing the information provided, follow the directions at the top of the chart on page 8. It should take you about 15 to 30 minutes to complete the worksheet and summarize your risk ratings.

Information derived from Home\*A\*Syst worksheets is intended only to provide general information and recommendations to rural residents regarding their own homestead practices. It is not the intent of this educational program to keep records of individual results.

# Glossary

## *Lawn and Garden Management*

*These terms may help you make more accurate assessments when completing Fact/Worksheet 11. They may also help clarify some of the terms used.*

**Available water capacity:** The capacity of the soil to store water available for plant use, usually expressed in linear depths of water per unit depth of soil. Commonly defined as the difference between the percentage of soil water at field capacity and the percentage at wilting point.

**Fertilizer:** A substance that is added to soil to increase the nutrient content of a soil.

**Field capacity:** The percentage of water remaining in a soil two or three days after having been saturated and after free drainage has practically ceased.

**Herbicides:** A pesticide that is used to manage weeds.

**Insecticides:** A pesticide that is used to manage insects.

**Irrigation water management:** The use and management of irrigation water where the quantities of water used for each irrigation is determined by available water capacity of the soil and the need for the crop, and where the water is applied at a rate and in such a manner that the crop can use it efficiently and significant erosion does not occur.

**Leachability:** The ease with which a chemical is dissolved by water. The more readily a chemical is dissolved by water, the more readily it can be move in the subsurface and contaminate ground water.

**Leaching:** The removal from the soil in solution of the more soluble materials by percolating water.

**Nematocides:** A pesticide that is used to manage nematodes.

**Organic fertilizer:** Fertilizers that are derived from natural sources, such as oceans, rocks, animal by-products, or plants and release their nutrients over a long period of time (6 months to 5 years).

**Pesticides:** A substance used to manage plant disease, insects, weeds, or rodents.

**Rodenticides:** A pesticide that is used to manage rodents.

**Synthetic fertilizer:** Fertilizers that are manufactured and release their nutrients over a very short period of time.

**Wilting point:** The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower plants) wilt and fail to recover their turgidity when placed in a dark, humid atmosphere.



# Improving Lawn and Garden Management

## Keeping Idaho's

## - Water Clean

Idaho homeowners are rightly proud of their beautiful lawns and gardens, however, large quantities of fertilizers, pesticides, and water are often applied to obtain these results. Overuse or misapplication of chemicals can have a detrimental impact on ground water that supplies your well. Recent surveys in Idaho have found trace amounts of nitrates and pesticides in drinking water. Over watering can compound water quality problem by causing the chemicals to leach into the ground water or runoff into the surface water.

The material in this fact sheet provides information for the homeowner on management practices for lawns and gardens to reduce the potential for surface and ground-water contamination. The accompanying worksheet will allow you to assess the impact of your current management practices on the quality of your drinking water.

### ***Pesticide concerns for lawns and gardens***

Why should homeowners be concerned about pesticide use on their lawns and gardens?

Compared to a farmers field, some homeowners use a larger quantity of pesticides on their lawns and gardens. Pesticide over use or misapplication may cause the following:

- Harm or kill beneficial insect and earthworms associated with your lawn or garden;
- Harm wildlife and pets that come in contact with your lawn or garden;
- Result in chemical runoff during rainfall or irrigation into streams, rivers, lakes, and storm water sewers which may contaminate the ground water;
- Leach through the soil directly into ground water which is used for drinking water;
- Accumulate in the soil and become toxic to the plants you are growing; and
- Create pest resistance to the applied chemicals so that they will be very difficult to control in the future.

### ***Fertilizer concerns for lawns and gardens***

Why should homeowners be concerned about fertilizer use on lawns and gardens?

Some homeowners use a larger quantity of fertilizer on their lawns and gardens than is really needed. Fertilizer over use or misapplication may cause:

- Contaminate surface water with nitrates through surface runoff or storm water sewers.
- Contaminate drinking water from ground water wells with nitrates, which is hazardous especially to pregnant women, infants, and small children.
- Contaminate surface water with nitrates through surface runoff or storm water sewers.

- Cause diseases, such as necrotic ring spot in lawns, if you are also watering too heavily or at the wrong time.
- Make some weeds more competitive with the plants you are trying to grow.

## 1. Lawns

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Your lawn is something you should be proud of. It is an attractive part of your landscape. In fact, a well maintained lawn adds value to your property and helps to tie together your home and other landscape plants.

A healthy good looking lawn actually improves your living environment. On a hot day, your lawn reduces the glare of the sun, keeps surrounding areas cooler, and will attract birds and other wildlife. On windy days, your lawn protects the soil on your property from erosion.

Some Idaho homeowners intensively manage their lawns and gardens by using large quantities of chemicals. Pesticides, fertilizers, and water, when used incorrectly may adversely impact the quality of your drinking water. To protect your water quality and the environment, you should use best management practices (BMPs), which are defined as strategies that eliminate or minimize pollution. BMPs are designed to be compatible with good, sound lawn management but can also protect the quality of water from your drinking water well.

### ***Pest management for lawns***

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Many pests attack lawns. These pests fall under four broad categories: weeds, insects, diseases, and other pests.

**Weeds:** Weeds simply are plants growing in the wrong place. In the case of your lawn, a weed is any plant that is not the variety of grass that was originally seeded to produce your lawn. There are over 30 weeds common to lawns in the Pacific Northwest. Most of these weeds can be easily eliminated from your lawn by using management options that discourage the competition from weeds. These options include mowing to the proper height, not over fertilizing or watering. Chemicals are also an option and the ones that kill weeds are called herbicides.

**Insects:** Several dozen different insects live in your lawn at any one time. Most of these insects are harmless and in fact, many insects are actually beneficial. These beneficial insects prey on insect pests that harm your lawn. Chemicals applied to lawns to kill insects are called insecticides.

**Diseases:** Lawns are susceptible to several different diseases. Many of the diseases that attack lawns are caused by improper management by the homeowner. Some potential management problems include improper watering and fertilization, lack of thatch removal, and choosing the wrong grass type for the climate. Chemicals that are applied to lawns to control disease problems are usually called fungicides.

**Other pests:** Several categories of non-insect pests attack lawns. These include rodents (moles and gophers), nematodes, snails, slugs, and ants. Chemicals used to kill rodents are called rodenticides. Chemicals used to kill nematodes are called nematocides.

**Pest management BMPs that should be implemented for lawns include:**

- Know what is in your lawn. Identify weeds, insects, pests, disease problems, and your grass type (bluegrass, fescue, etc.) so you can choose the proper solution to your problem.
- Use the least toxic solution to your problem. For example, consider hand pulling weeds, change water management practices instead of using fungicides to control diseases, and live with a low level of plant damage.
- Use pesticides carefully. Be sure to match the pesticides with the problem, follow label directions, use the correct application rates, buy only what you need, and if possible spot treat rather than treat the entire lawn.
- Store and dispose of pesticides properly. Buy pesticides in small quantities, store it in a secured area away from your water well and dispose of the material safely through your locally organized household hazardous waste collection. The Pesticide Disposal Program, Idaho Department of Agriculture, (208) 332-8500, targets pesticide users at agriculture rater, but in some cases may be able to provide assistance for rural home owners.
- Use water wisely on lawns. Over-watering may cause pesticides to leach and contaminate the ground water you use for drinking water.

### ***Fertilizer management for lawns***

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Lawns in Idaho generally need additions of only four nutrients: nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). However, if your soil pH exceeds 6.8, your lawn may also require additions of iron (Fe). Most soils in Idaho have adequate amounts of trace elements, such as copper, manganese, nickel, and zinc to meet lawn needs. BMPs for fertilizer management should include the following:

- Test your soil. The results of the test will help you determine what kind and how much fertilizer you need to apply to keep your lawn healthy. Soil testing kits are available at most lawn and garden shops for a small cost or assistance may be provided by your county Cooperative Extension System agent.
- Use fertilizers that slowly release the nutrients. By using slow release fertilizers, the lawn is fed slowly so there is no excess fertilizer to leach to the ground water that you use for drinking water. Also, using slow release fertilizer eliminates the risk of burning the grass.

### ***Irrigation water management for lawns***

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Water is a precious, limited resource and we need to not only watch how we water lawns to prevent the leaching of chemicals into the ground water, but we also need to be sure we do not waste it by over watering. Both your lawn and water bill can benefit by using the following BMPs for lawn watering:

- Apply water only when it needs it. The lawn needs water when it begins to wilt from dryness (color dulls and footprints stay compressed for more than a few seconds) or about a couple times a week. When you do water, water slowly and apply about an inch of water, then let the lawn dry out before watering again. Be sure to water during times when evaporation is lowest, for example, in the early morning.
- Avoid over watering. Avoid this at all times, but especially after applying fertilizers and pesticides. Too much water will push the fertilizer past the grass root zone into ground water or cause the applied pesticide to runoff into surface water or leach into ground water.

## 2. Gardens

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Your garden is a complex ecosystem of plants, animals, insects, birds, fungi, worms, and microorganisms such as bacteria. All ecosystems have three basic interacting categories of organisms:

- Producers, which are green plants that convert sunlight, carbon dioxide, and water into energy for plant growth.
- Consumers, which are organisms that feed on live plant or animal material.
- Decomposers, which use dead plant and animal material for energy.

A healthy garden ecosystem will have a balance between producers, consumers, and decomposers. If there is an imbalance, symptoms such as plant disease or an increase of damaging pests may result.

An imbalance in the ecosystem can be caused by improper applications of pesticides, fertilizers, and water or by removing organic matter, such as leaves, from the garden. By using gardening BMPs, you will reduce the potential for gardening problems and thus the need for chemical controls. By reducing the use of chemicals, the risk of contaminating your drinking water is also reduced.

### ***Pest management for gardens***

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It is best to try to not use pesticides as both beneficial insects and pests may be killed. The following pest management BMPs will help keep your garden ecosystem healthy.

- Create a garden with diversity. Plant a combination of different types of plants to create a balanced ecosystem and in general, rotate plants each year to outsmart potential pests and minimize the threat of soil borne diseases.
- Maximize conditions for healthy plant growth. Choose plants that are suited for your climate and are resistant to diseases in the area. Group plants according to water and light requirements and space them to allow ample root and top growth at maturity.
- Protect and use beneficial insects. Develop garden habitats to ensure a healthy environment for beneficial insects. Also, learn to recognize the eggs and larvae of beneficial insects so as to not harm them.
- Use the least toxic solution for your problems. Some low toxic methods to solve problems include biological controls, insect traps, or mechanical means to remove pests. Also, learn to live with a low level of plant damage.
- If you do use herbicides or pesticides, use them carefully. Identify the insect and weed pests and select the appropriate chemical. Also, buy only what you need and be sure to follow label directions.
- Store and dispose of herbicides and pesticides properly. Store any extra in a secured area, and if you need to dispose of these chemicals, take it to your locally organized household hazardous waste collection. The Pesticide Disposal Program, Idaho Department of Agriculture, (208) 332-8500, targets pesticide users at agricultural rates, but in some cases may be able to provide assistance for rural homeowners.

## ***Fertilizer management for gardens***

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Fertilizer should be added only in the amounts needed, at the appropriate time, and in a form that makes the nutrients available to plants. Nutrient management BMPs to implement in your garden include:

- Test your soil. Test your soil for nitrogen (N), phosphorus (P), potassium (K), sulfur (S), pH, and organic matter. Soil samples should be taken to a depth of 12 inches.
- Build a healthy soil. Add organic matter, such as compost to enhance the structure, aeration, and nutrient and water holding capacity of the soil. Organic matter can also be added by growing cover crops. Also, try to supply needed nutrients using organic fertilizers, such as composted manure, cottonseed meal, bone meal, blood meal, and greensand. Most gardening shops have these types of fertilizers. If not, you can order from gardening retailers that specialize in providing organic fertilizers and pesticides.
- Apply fertilizers properly. Based on your soil test and plant needs, apply the proper rate of nutrients and apply it at the correct growth stage of the plant. Overfeeding plants can be as detrimental as underfeeding, but this risk can be reduced if organic fertilizers are used, because the nutrients are released slowly. Synthetic fertilizers are also useful, as they can provide readily needed nutrients. Be sure not to over apply.

## ***Irrigation water management for gardens***

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Excess water use may result in nutrients leaching below the root zones into the ground water that is used for drinking water. Excess watering can also leach pesticides into ground water. Some water management BMPs are:

- Reduce the need for watering by mulching. Mulches not only show the evaporation of water from the soil surface but also can improve a soil's water holding capacity, keep the soil cooler on hot summer days, reduce weed growth, and help prevent soil erosion. Examples of organic mulches include grass clippings, leaves, and straw. Inorganic mulches may also be used and examples are permeable sheeting and/or rock. Keep in mind that rocks can form undesirable heat sinks.
- Reduce the need for watering by improving soil structure. Each year be sure to add organic matter such as compost, grass clippings, tilled in cover crops, and other dead plant materials.
- Irrigate only when the plants need water. Check whether the soil is dry several inches below the surface. If it is dry, then water, but water slow enough so that it soaks into the root zone and does not run off the soil surface. The depth of the root zone depends on the plant, but in general this is 6 to 18 inches deep. If possible, use a drip irrigation system to conserve water.

## **3. Summary**

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To help protect the quality of your drinking water for your family and future generations, it is important to implement BMPs for pest, fertilizer, and water management for your lawn and garden.

# Lawn and Garden Management: Assessing Drinking Water Contamination Risk

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your homestead, read across to the right and **circle** the statement that **best** describes conditions on your homestead (skip and leave blank any categories that don't apply to your homestead).

3. Then look above the description you circled to find your "rank number" (4, 3, 2, or 1) and enter that number in the blank under "your rank."
4. Complete the section "What do I do with these rankings?"
5. Allow about 15-30 minutes to complete the worksheet and summarize your risk rankings for well management practices.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
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## WELL LOCATION (Addressed in Section 1 and 2)

<b>Location of well in relation to area of application</b>	Most of area is down gradient from well. Surface water is diverted from well.	Area is at grade or down gradient from well. Surface water is diverted from well.	Area is at grade or up gradient from well. Surface water runoff may reach well.	Area is up gradient from well. Surface water runoff reaches well.	_____
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<b>Use of chemicals to control pests</b>	No application of chemicals. Use non-toxic solutions to problems.	Use mostly non-toxic solutions to problems. Some careful spot use of chemicals.	Limited use of chemicals, but more than spot use.	Use of chemicals on large areas.	_____
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<b>Relative leachability of pesticide</b>	Low	Low-Medium	Medium-High	High	_____
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<b>Storage of pesticides</b>	Storage of pesticides in a secured area away from the well.	_____	_____	Storage of pesticides in close vicinity to the well.	_____
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<b>Disposal of pesticides</b>	Disposal through a local household hazardous waste collection or other appropriate means.	_____	_____	Disposal on property in close vicinity to the well.	_____
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	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
<b>FERTILIZER MANAGEMENT</b> ( <i>Addressed in Section 1 and 2</i> )					
<b>Location of application</b>	Most of area is down gradient from well. Surface water is diverted from well.	Area is at grade or down gradient from well. Surface water is diverted from well.	Area is at grade or up gradient from well. Surface water runoff may reach well.	Area is up gradient from well. Surface water runoff reaches well.	_____
<b>Solubility of fertilizer</b>	Low solubility: Use of organic fertilizer.	Low-Med solubility. Use of predominately synthetic fertilizers, but some organic fertilizers.	Med-High solubility. Use of predominately synthetic fertilizers, but some organic fertilizers.	High solubility. Use of synthetic fertilizers.	_____
<b>Amount of fertilizer application</b>	Application rates based on soil tests. Recommended amount calculated, measured, and applied.	Application rate based on soil tests. Recommended amount estimated, measured, and applied.	No soil tests. Plant needs estimated, then measured and applied.	No soil tests. Application of fertilizers at unknown rate.	_____
<b>Timing of fertilizer application</b>	Calculated total plant needs. Made several applications during the growing season, according to plant requirements.	Calculated total plant needs. Entire amount applied in one single application during the growing season.	Plant needs not determined, and entire amount applied in one single application during the growing season.	Plant needs not determined; fertilizer applied during the non-growing season.	_____
<b>Storage of fertilizers</b>	Storage of fertilizers in a secured area away from the well.	_____	_____	Storage of fertilizers in a non-secured area in close proximity to the well.	_____

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
<b>IRRIGATION WATER MANAGEMENT</b> ( <i>Addressed in Sections 1 and 2</i> )					
<b>Amount of water application</b>	Measured application based on the plants' consumption use requirements (in./day) and the soils' available water capacity.	Measured applications based on filling the soil to field capacity within the plants' effective root zone.	Non-measured applications based on estimates of the plants' needs.	Non-measured heavy applications based on neither the plants' needs or the soils' moisture levels.	_____
<b>Timing of water application</b>	Application of water based on the plants' needs and soil moisture levels.	Application of water based on plants' needs, but prior to the plants' wilting point.	Application of water based on convenience or when irrigation water is available.	Heavy application of water soon after use of pesticides and fertilizers.	_____

\*Use the USDA Natural Resources Conservation Service (NRCS) Information.

## What do I do with these rankings?

Use the following summary risk score by checking the appropriate risk level in the summary risk score table.

### Lawn and Garden Management Risk Rankings Summary

CATEGORY	Risk Rank			
	Low 4	3	2	High 1
Location of well in relation to area of pesticide application				
Use of chemicals to control pests				
Relative leachability of pesticide*				
Storage of pesticides				
Disposal of pesticides				
Location of application				
Solubility of fertilizer*				
Amount of fertilizer application				
Timing of fertilizer application				
Storage of fertilizers				
Amount of water application				
Timing of water application				

\* These practices in themselves do not create a situation that needs immediate attention. However, if combined with a high risk rate of application or timing of watering, then the situation will require immediate attention.

**Step 2: Look over your rankings for individual activities.**

**High Risk Practices (1)** Pose a high risk for your health and for contaminating ground water.

**Moderate to High Risk Practices (2)** Are inadequate protection in many circumstances.

**Low to Moderate Risk Practices (3)** Provide reasonable ground-water protection.

**Low Risk Practices (4)** Are ideal; try to make this your goal.

Any shaded rankings require immediate attention. Some concerns, you can take care of right away; others could be major or costly projects requiring planning and prioritizing before you take action. The long term goal of the Home\*A\*Syst project is to improve homestead practices and structures so that they are classified as low risk. Activities classified as low risk generally reflect best management practices.

**Transfer any activities that you ranked in the shaded areas in step 1 to the "High-Risk Activities" on pages two, three, and four of Worksheet B.**

**Step 3: Read the materials provided in this document, if you haven't done so already. Consider how you might modify your homestead practices to better protect your drinking water.**

## Contacts and References

### Who to call about...

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#### **Soil testing and interpretation:**

- Cooperative Extension System serving your county
- Local Soil Conservation Districts
- Local gardening centers

#### **Pesticide information:**

- Cooperative Extension System serving your county
- Idaho Department of Agriculture, Agriculture Technology, (208) 332-8500
- Local Soil Conservation Districts
- Local gardening centers
- National Pesticide Telecommunications Network, (800) 858-7378

#### **Fertilizer information:**

- Cooperative Extension System serving your county
- Idaho Department of Agriculture, Agriculture Technology, (208) 332-8500
- Local Soil Conservation Districts
- Local gardening centers

#### **Least toxic methods for lawn and garden problems:**

- Cooperative Extension System serving your county
- Bio-Integral Resource Center, P.O. Box 7414, Berkeley, CA 94707
- Libraries, bookstores, garden centers

### What to read about...

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- *EPA Citizens Guide to Pesticides*, EPA Office of Pesticide Programs, Field Operations Division, H7506C, 401 M Street, SW Washington, D.C. 20460
- *Healthy Lawn, Healthy Environment*, U.S. Environmental Protection Agency, June 1992.
- *Nitrate and Groundwater*, Idaho Cooperative Extension System, Current Information Series #872.
- *Pesticide Handling Practices to Protect Groundwater*, Idaho Cooperative Extension System, Current Information Series #861.
- *Pesticides and Their Movement in Soil and Water*, Idaho Cooperative Extension System, Current Information Series #865.
- *Pests of the Garden and Small Farm, A Growers Guide to Using Less Pesticides*, Division of Agriculture and Natural Resources, University of California, 6701 San Pablo Avenue, Oakland, California 94608-1239, (415)642-2431.



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Idaho Association of Soil Conservation Districts (IASCD)  
Idaho Department of Agriculture (IDA)  
Idaho Department of Health and Welfare-Division of  
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Idaho Department of Water Resource (IDWR)  
Idaho Public Health Districts  
Idaho Soil Conservation Commission (SCC)  
Idaho Water Resources Research Institute (IWRRI)  
University of Idaho-Cooperative Extension System (CES)  
USDA-Farm Service Agency (FSA)  
USDA-Natural Resources Conservation Service (NRCS)  
USDA-Rural Economic and Community Development  
(RECD)  
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Information derived from **Home\*A\*Syst** worksheets is intended only to provide general information and recommendations to rural residents regarding their own homestead practices. All results are confidential.

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